FIG.1

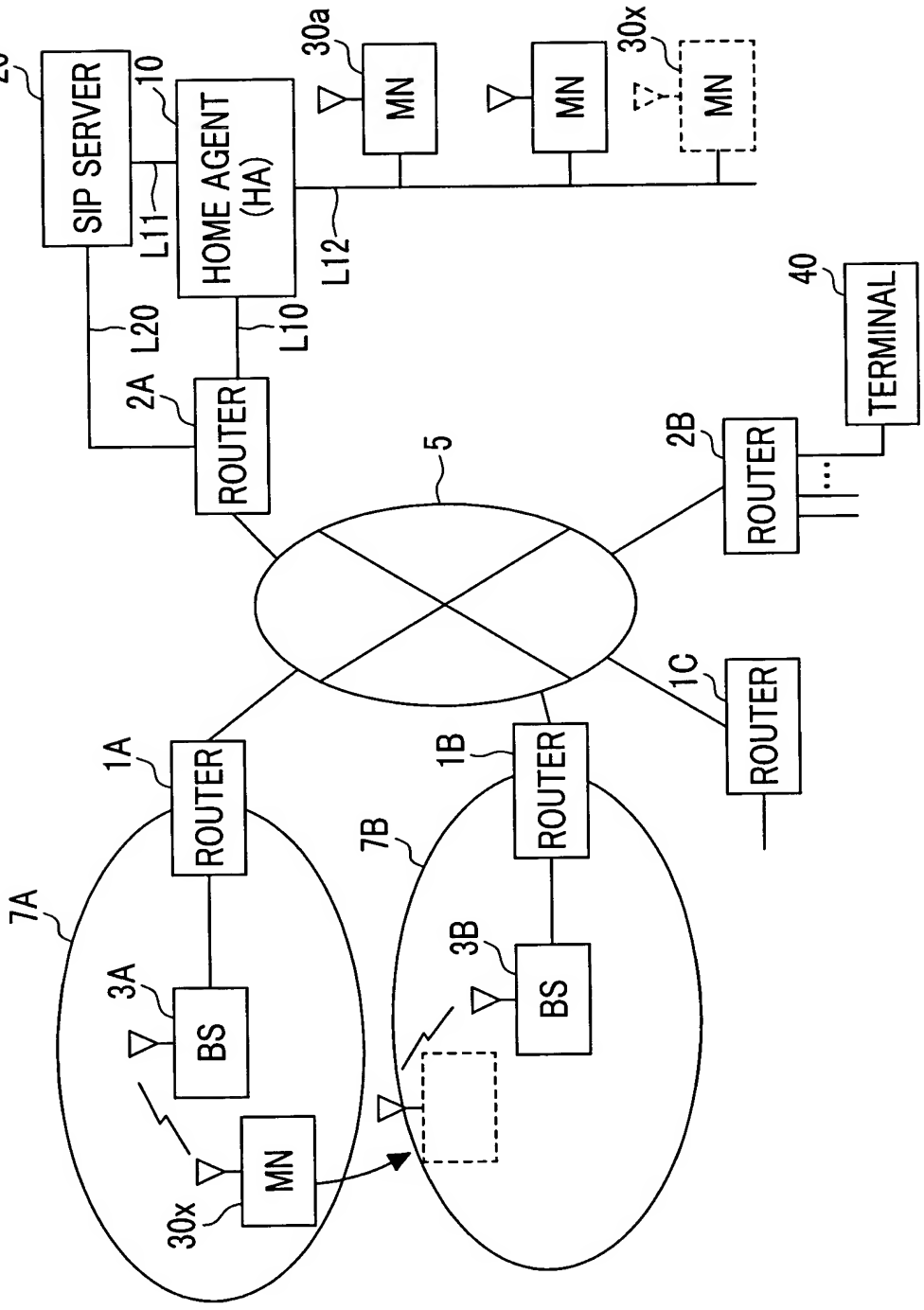

20
SIP SERVER
10
HOME AGENT (HA)
L11
L12
L10
L20
30a
MN
30x
MN
2A
ROUTER
5
2B
ROUTER
40
TERMINAL
1C
ROUTER
1A
ROUTER
1B
ROUTER
7A
7B
3A
BS
3B
BS
30x
MN

FIG.2

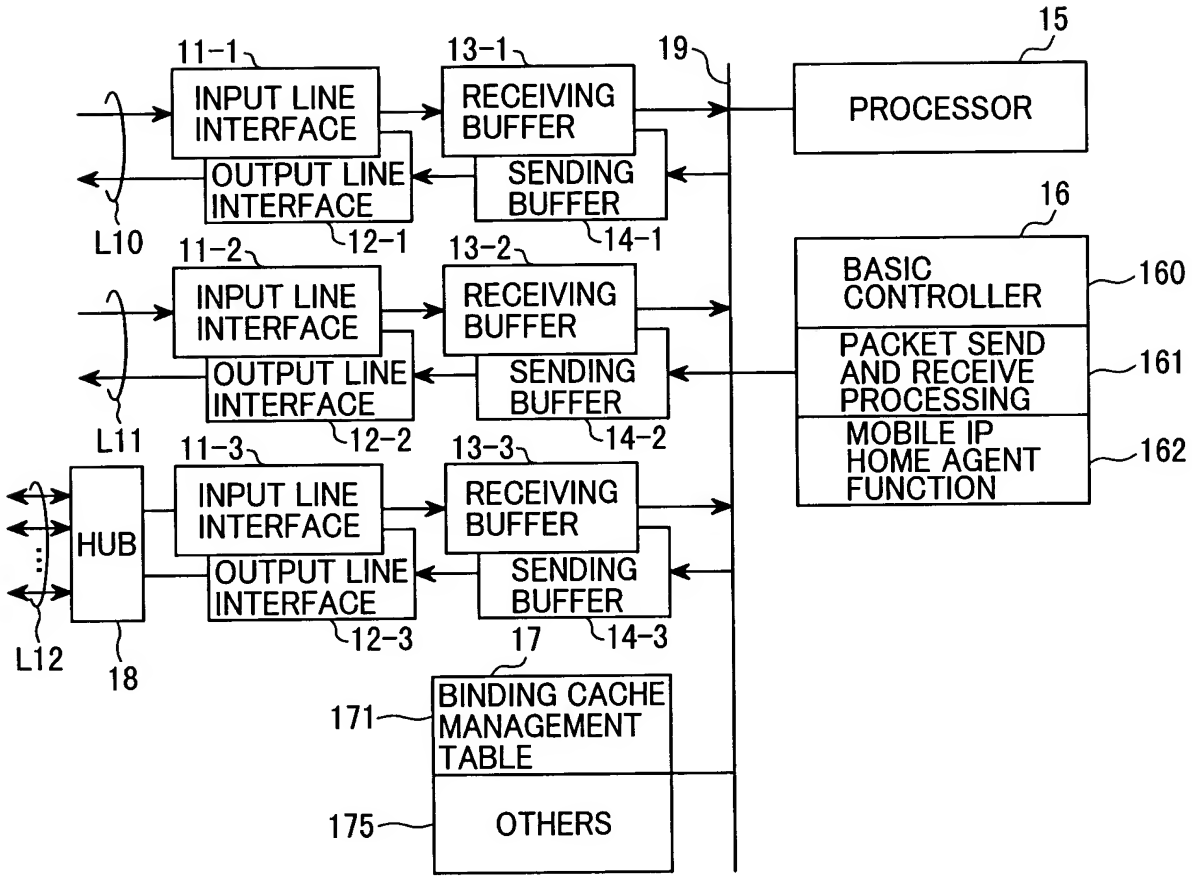

HOME AGENT 10
15
11-1
13-1
19
INPUT LINE INTERFACE
RECEIVING BUFFER
PROCESSOR
OUTPUT LINE INTERFACE
SENDING BUFFER
16
L10
12-1
14-1
11-2
13-2
BASIC CONTROLLER
160
INPUT LINE INTERFACE
RECEIVING BUFFER
PACKET SEND AND RECEIVE PROCESSING
161
OUTPUT LINE INTERFACE
SENDING BUFFER
L11
12-2
14-2
MOBILE IP HOME AGENT FUNCTION
162
11-3
13-3
HUB
INPUT LINE INTERFACE
RECEIVING BUFFER
OUTPUT LINE INTERFACE
SENDING BUFFER
L12
12-3
14-3
17
18
171
BINDING CACHE MANAGEMENT TABLE
175
OTHERS

FIG.3

BINDING CACHE MANAGEMENT TABLE 171

1711 HOME ADDRESS	1712 CoA	1713 LIFETIME	1714 SEQUENCE NUMBER FOR AUTHENTICATION	1715 OTHERS	
					1710-1
					1710-2
⋮	⋮	⋮	⋮	⋮	

FIG.4

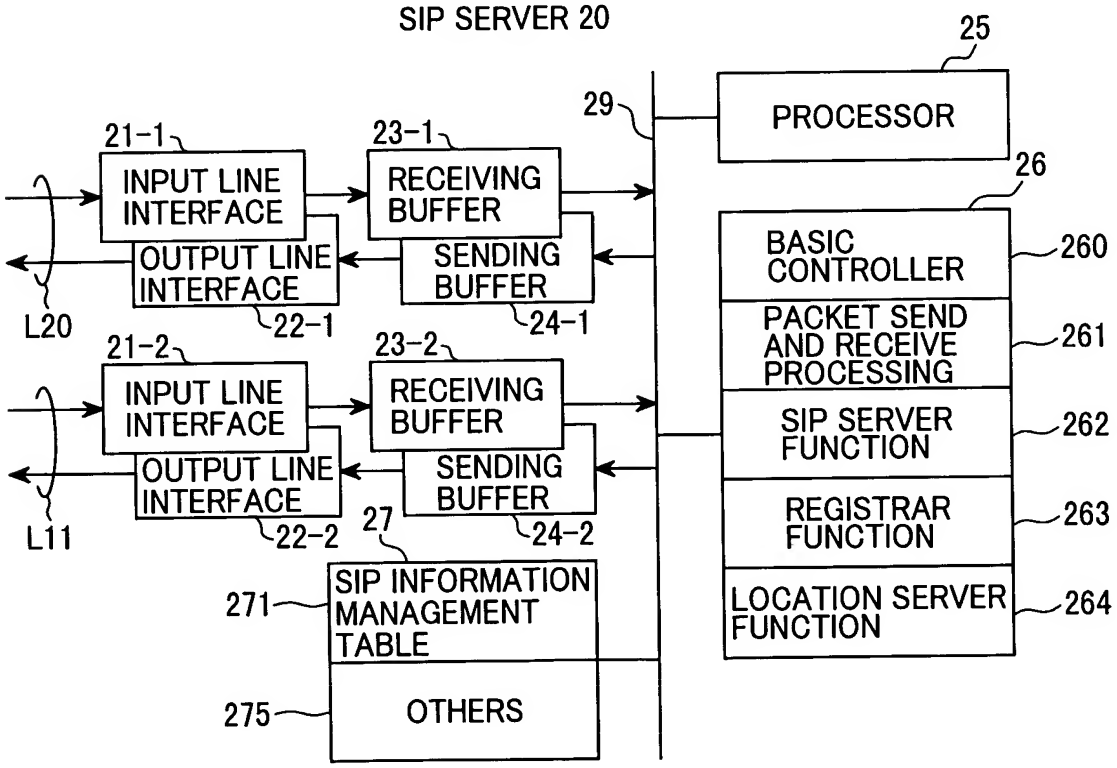


FIG.5

SIP INFORMATION MANAGEMENT TABLE 271

2711 SIP IDENTIFIER (SIP-URI)	2712 TERMINAL LOCATION INFORMATION	2713 EXPIRES	2714 CALL-ID	2715 SEQUENCE NUMBER (CSeq)	
xxxxxxxxxx	xxxxxxxxx	xxxxxx	xxxxxx	xxxx	2710-1
xxxxxxxxxx	xxxxxxxxx	xxxxxx	xxxxxx	xxxx	2710-2
⋮	⋮	⋮	⋮	⋮	
userMN@home.com	userMN@mn6	xxxxxx			2710-n

FIG.6

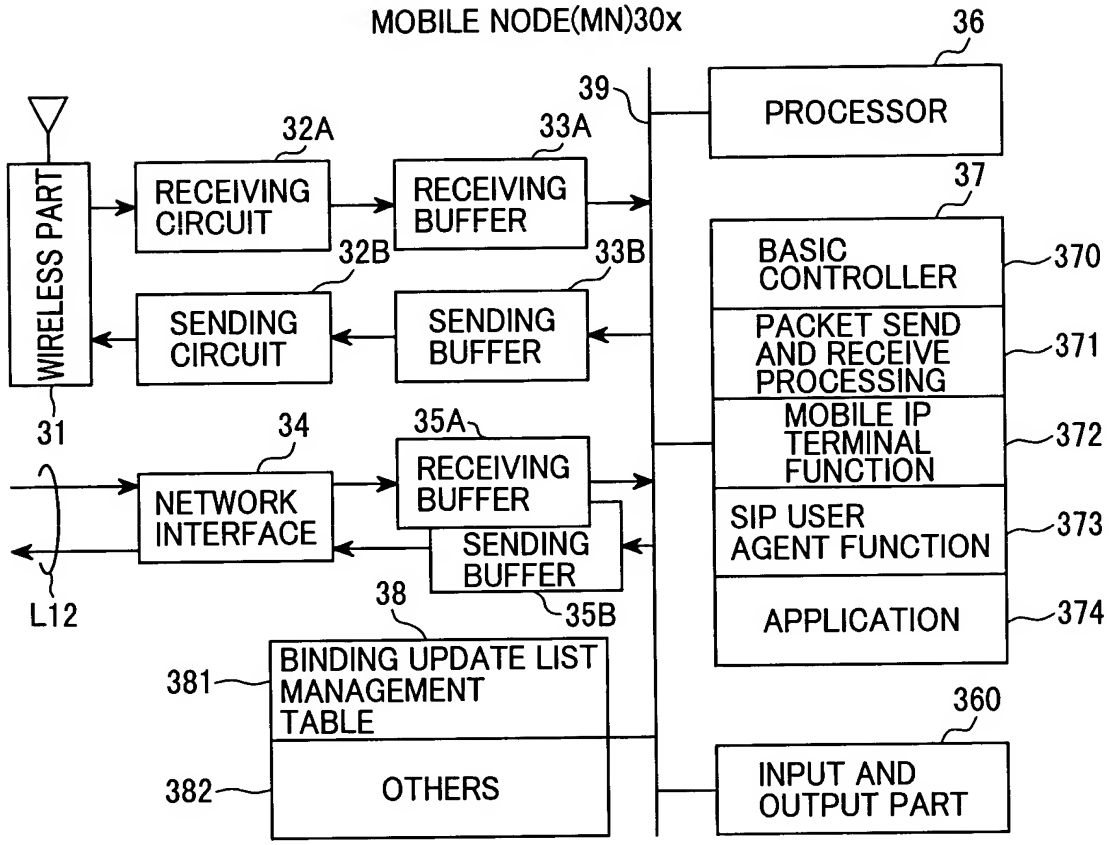


FIG.7

BINDING UPDATE LIST MANAGEMENT TABLE 381

3811 DESTINATION ADDRESS OF BINDING UPDATE	3812 MN HOME ADDRESS	3813 CoA	3814 LIFETIME	3815 SEQUENCE NUMBER FOR AUTHENTICATION	3816 OTHERS	
						3810-1
						3810-2
⋮	⋮	⋮	⋮	⋮	⋮	

FIG.8

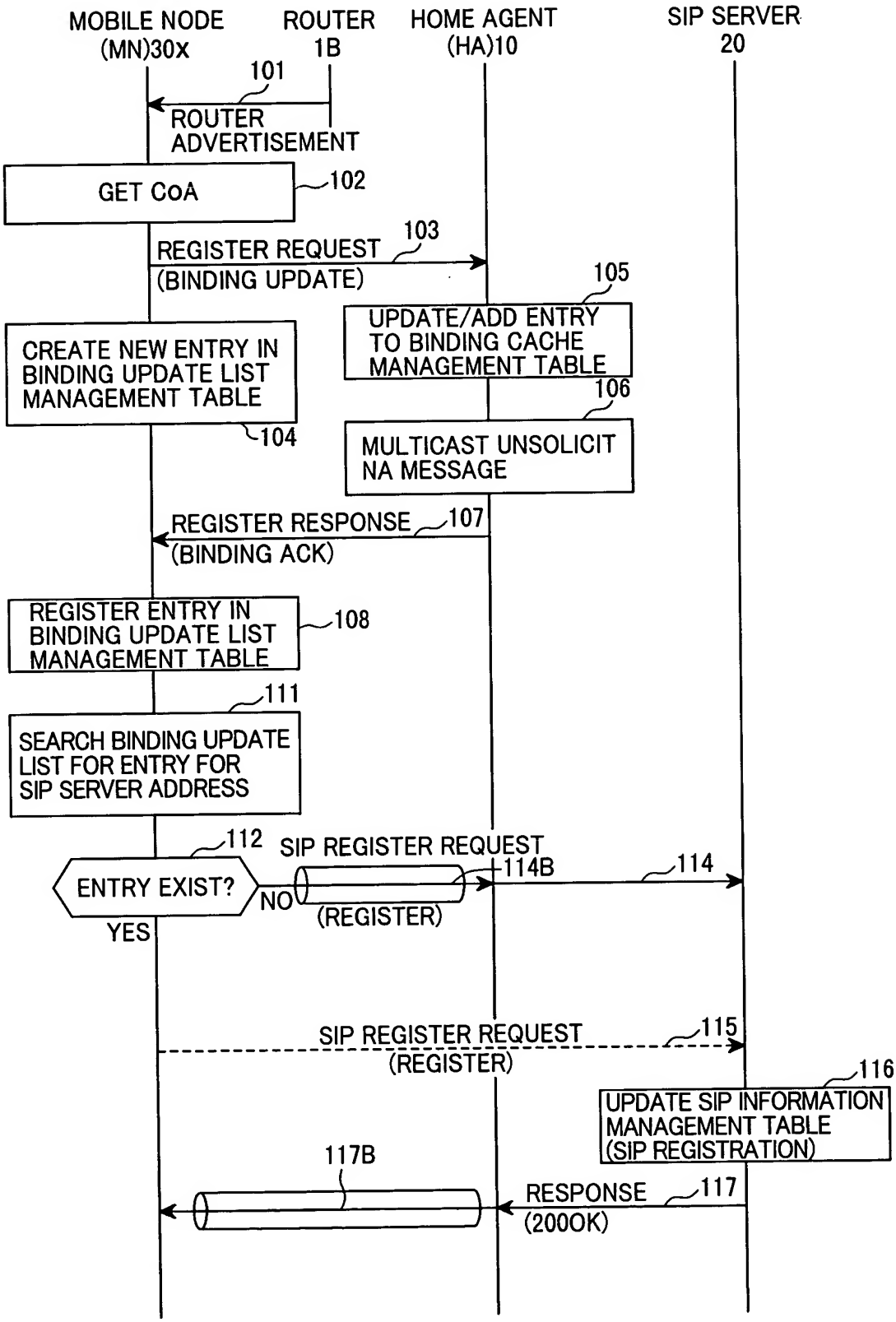

MOBILE NODE (MN)30x
ROUTER 1B
HOME AGENT (HA)10
SIP SERVER 20
101
ROUTER ADVERTISEMENT
GET CoA
102
REGISTER REQUEST (BINDING UPDATE)
103
UPDATE/ADD ENTRY TO BINDING CACHE MANAGEMENT TABLE
105
CREATE NEW ENTRY IN BINDING UPDATE LIST MANAGEMENT TABLE
104
MULTICAST UNSOLICIT NA MESSAGE
106
REGISTER RESPONSE (BINDING ACK)
107
REGISTER ENTRY IN BINDING UPDATE LIST MANAGEMENT TABLE
108
SEARCH BINDING UPDATE LIST FOR ENTRY FOR SIP SERVER ADDRESS
111
ENTRY EXIST?
112
NO
YES
SIP REGISTER REQUEST (REGISTER)
114B
114
SIP REGISTER REQUEST (REGISTER)
115
UPDATE SIP INFORMATION MANAGEMENT TABLE (SIP REGISTRATION)
116
RESPONSE (200OK)
117
117B

FIG.9

IPv6 PACKET 50

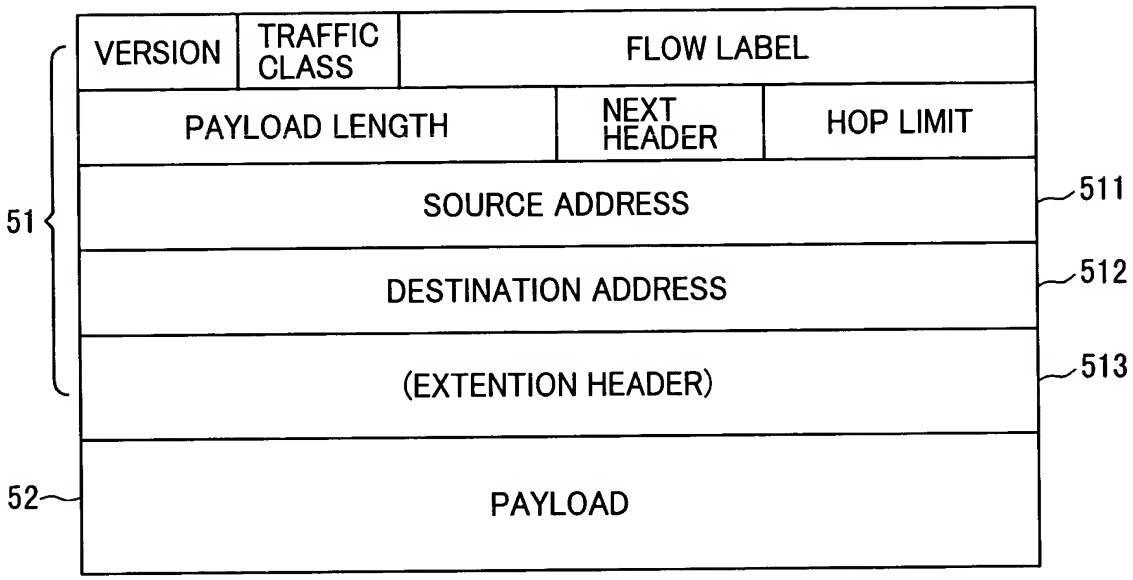


FIG.10

ROUTER ADVERTISEMENT MESSAGE 60

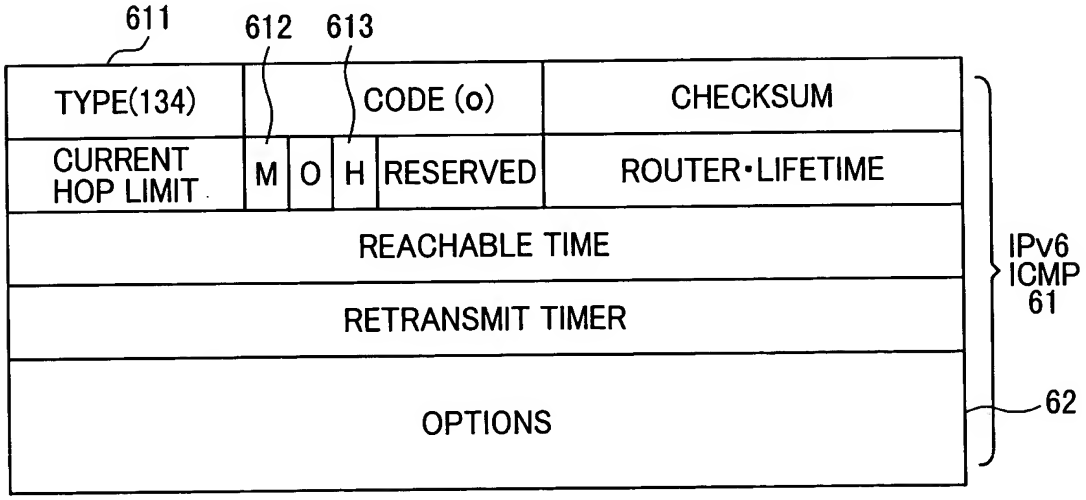


FIG.11

BINDING UPDATE MESSAGE 70A

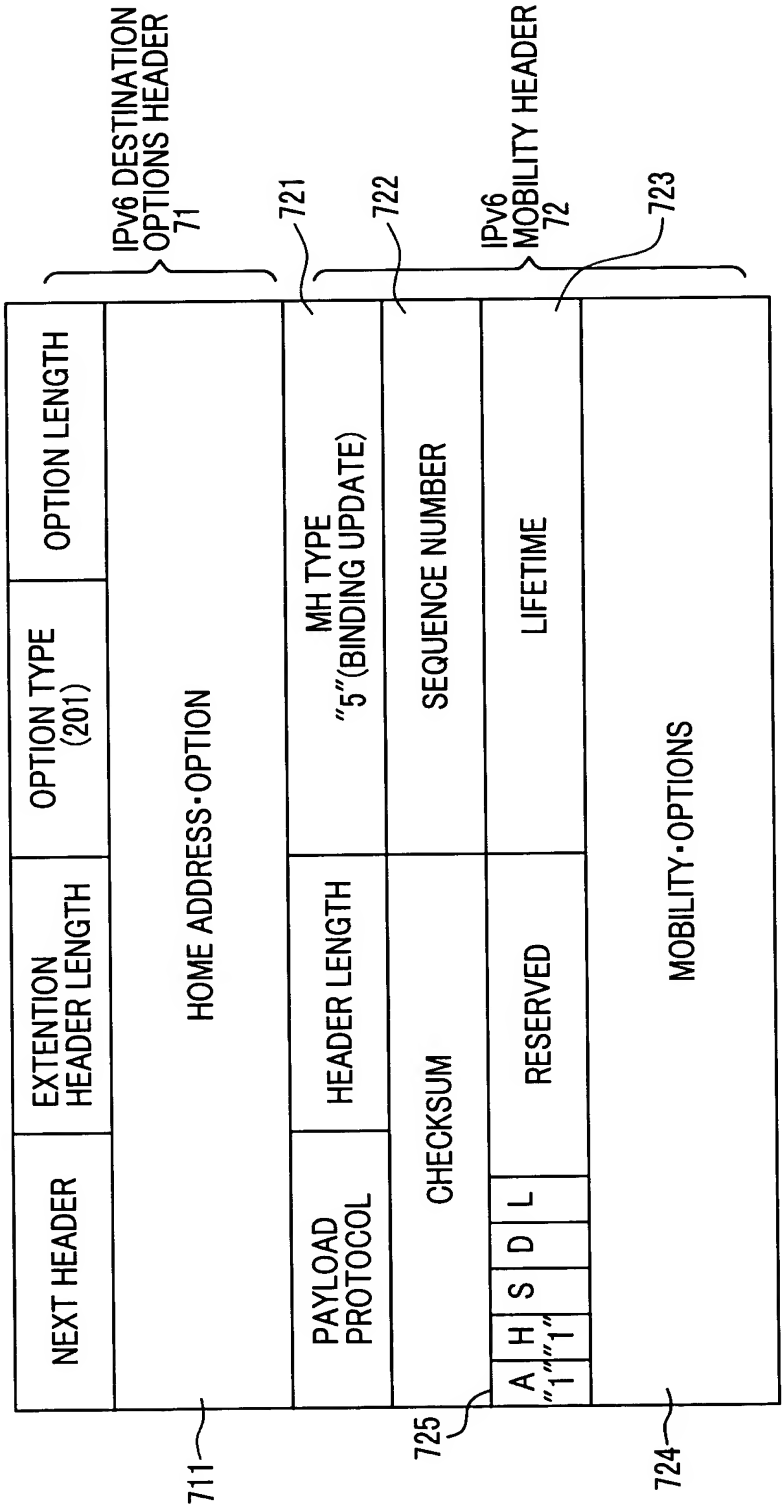


FIG.12

BINDING ACKNOWLEDGEMENT MESSAGE 70B

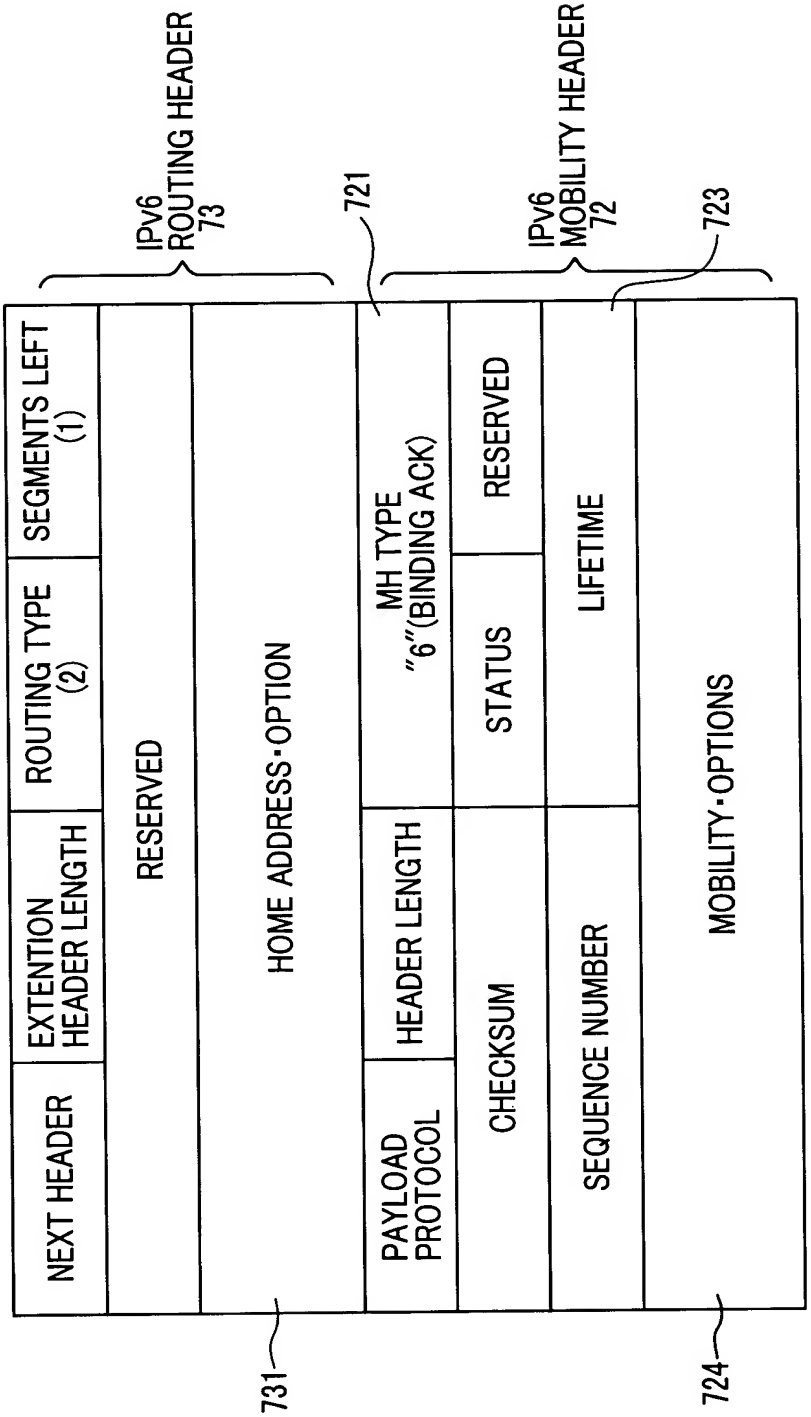


FIG.13

SIP MESSAGE PROTOCOL STACK

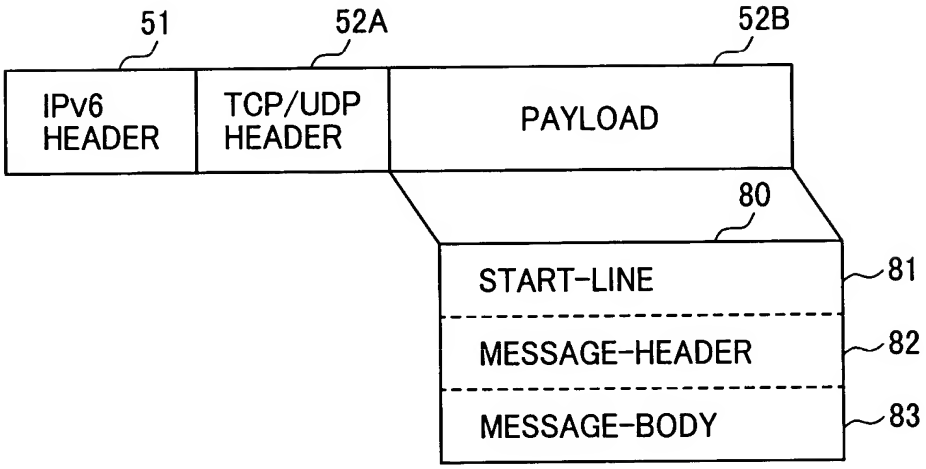


FIG.14

SIP REGISTER MESSAGE 80A

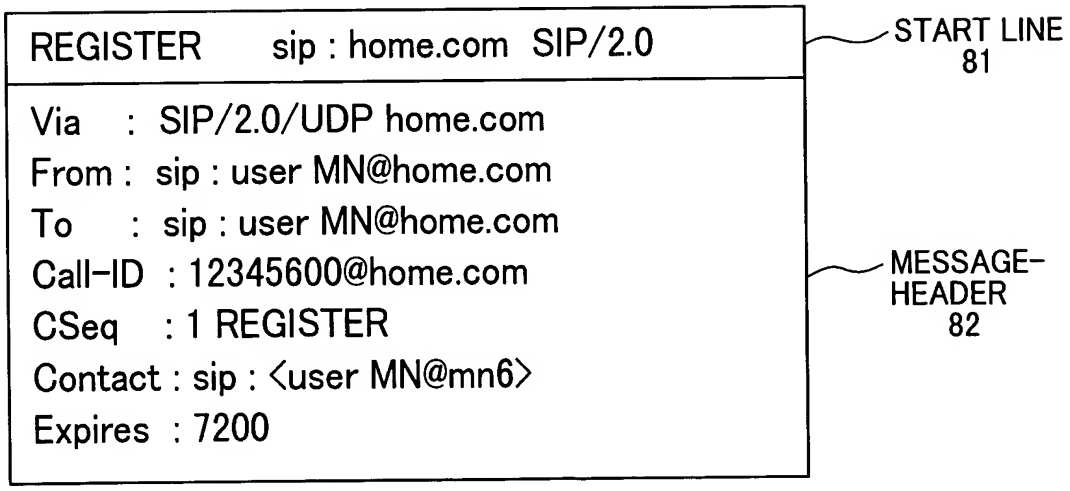


FIG.15

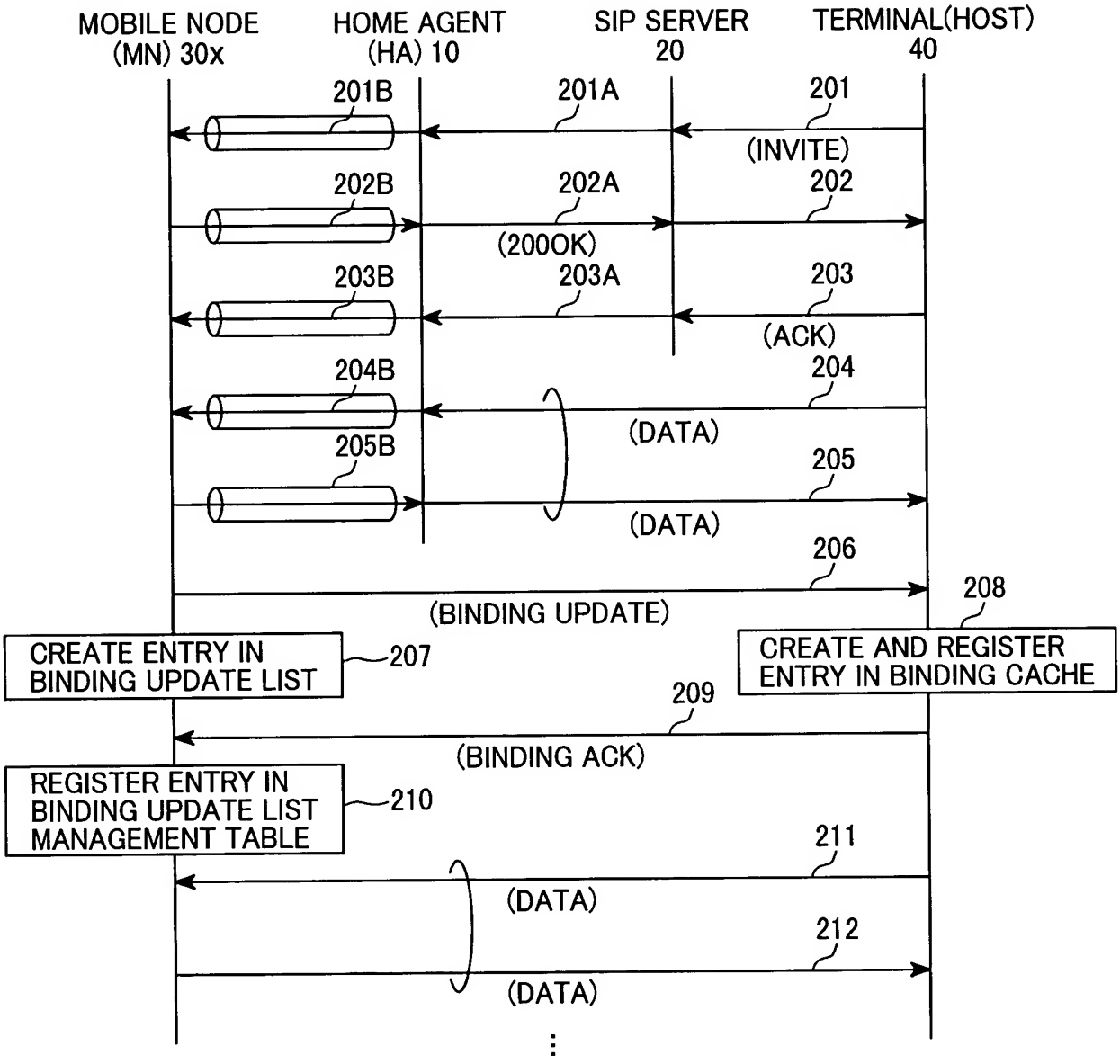

MOBILE NODE (MN) 30x
HOME AGENT (HA) 10
SIP SERVER 20
TERMINAL(HOST) 40
201B
201A
201
(INVITE)
202B
202A
202
(200OK)
203B
203A
203
(ACK)
204B
204
(DATA)
205B
205
(DATA)
206
(BINDING UPDATE)
208
CREATE ENTRY IN BINDING UPDATE LIST
207
CREATE AND REGISTER ENTRY IN BINDING CACHE
209
(BINDING ACK)
REGISTER ENTRY IN BINDING UPDATE LIST MANAGEMENT TABLE
210
211
(DATA)
212
(DATA)

FIG.16

SIP INVITE MESSAGE 80B

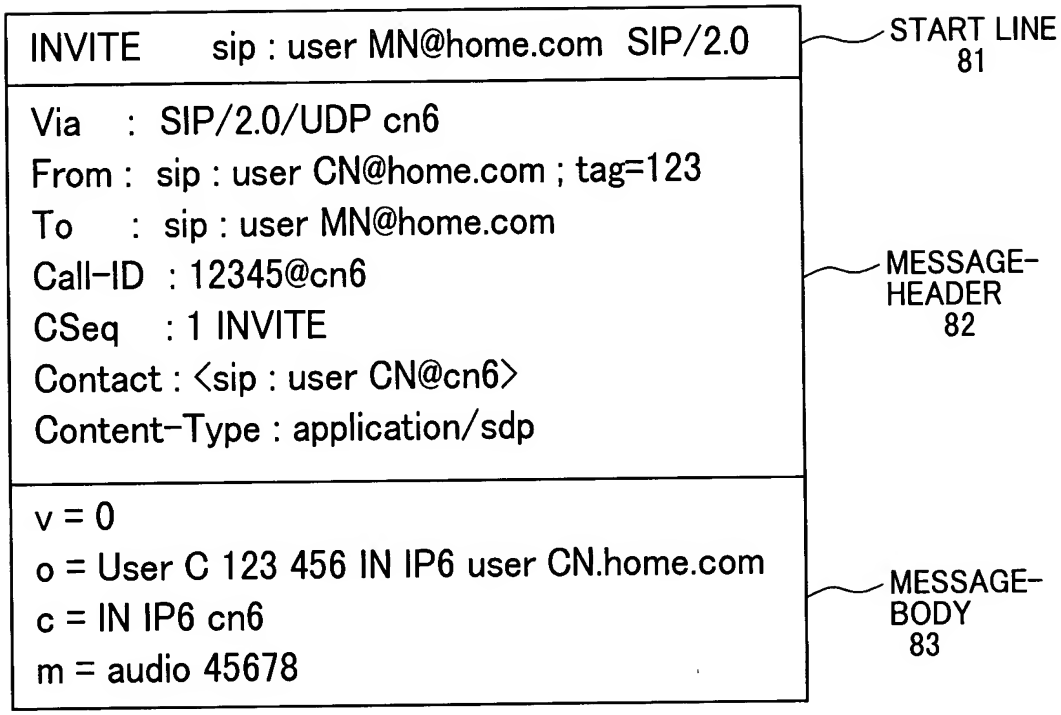


FIG.17

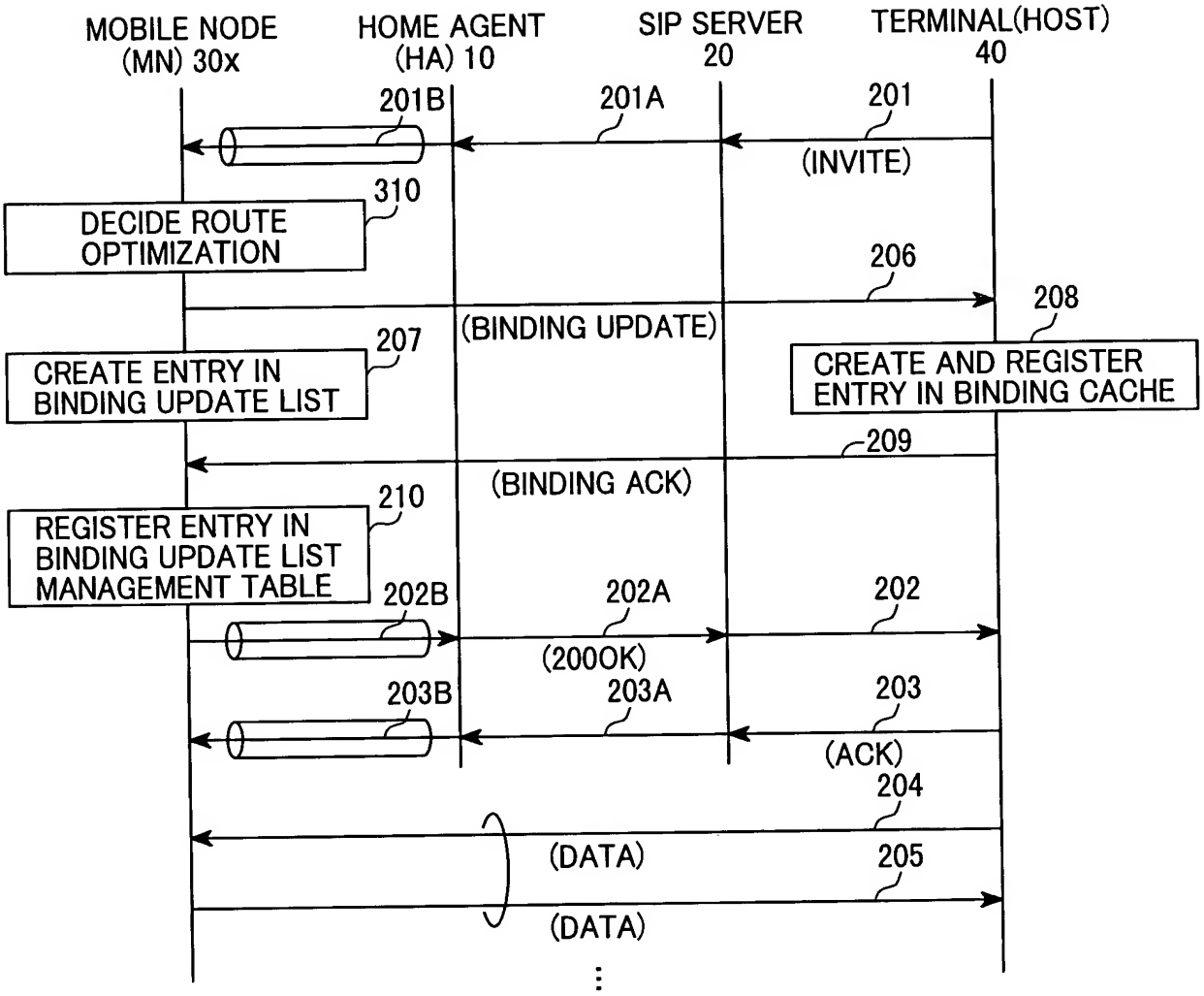

MOBILE NODE
(MN) 30x
HOME AGENT
(HA) 10
SIP SERVER
20
TERMINAL(HOST)
40
201B
201A
201
(INVITE)
310
DECIDE ROUTE
OPTIMIZATION
206
208
(BINDING UPDATE)
207
CREATE ENTRY IN
BINDING UPDATE LIST
CREATE AND REGISTER
ENTRY IN BINDING CACHE
209
(BINDING ACK)
210
REGISTER ENTRY IN
BINDING UPDATE LIST
MANAGEMENT TABLE
202B
202A
202
(200OK)
203B
203A
203
(ACK)
204
(DATA)
205
(DATA)

FIG.18

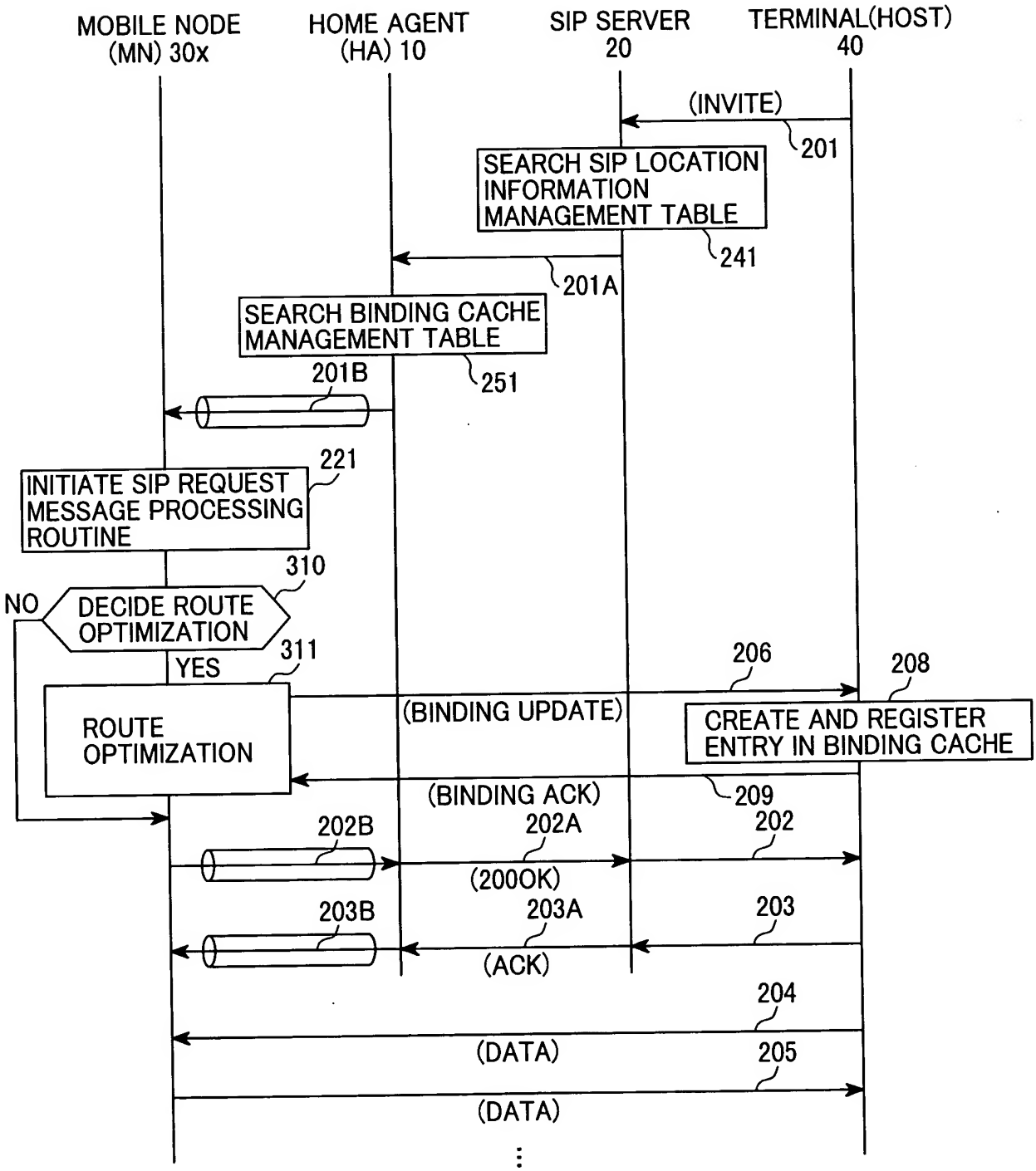

MOBILE NODE (MN) 30x
HOME AGENT (HA) 10
SIP SERVER 20
TERMINAL(HOST) 40
(INVITE)
201
SEARCH SIP LOCATION INFORMATION MANAGEMENT TABLE
241
201A
SEARCH BINDING CACHE MANAGEMENT TABLE
251
201B
221
INITIATE SIP REQUEST MESSAGE PROCESSING ROUTINE
310
NO
DECIDE ROUTE OPTIMIZATION
YES
311
206
208
ROUTE OPTIMIZATION
(BINDING UPDATE)
CREATE AND REGISTER ENTRY IN BINDING CACHE
(BINDING ACK)
209
202B
202A
202
(200OK)
203B
203A
203
(ACK)
204
(DATA)
205
(DATA)

FIG.19

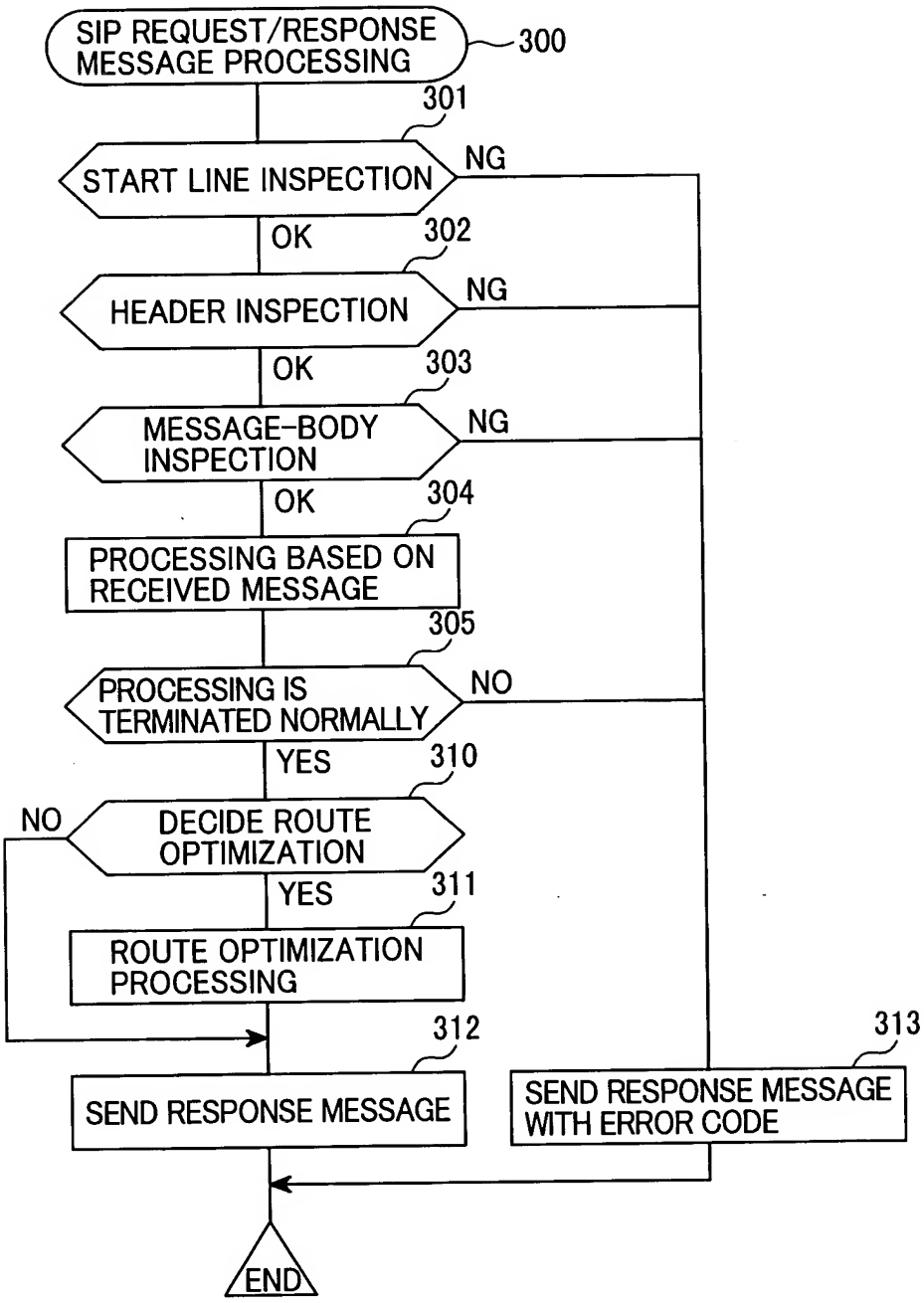

SIP REQUEST/RESPONSE MESSAGE PROCESSING
300
301
START LINE INSPECTION
NG
OK
302
HEADER INSPECTION
NG
OK
303
MESSAGE-BODY INSPECTION
NG
OK
304
PROCESSING BASED ON RECEIVED MESSAGE
305
PROCESSING IS TERMINATED NORMALLY
NO
YES
310
NO
DECIDE ROUTE OPTIMIZATION
YES
311
ROUTE OPTIMIZATION PROCESSING
312
SEND RESPONSE MESSAGE
313
SEND RESPONSE MESSAGE WITH ERROR CODE
END

FIG.20

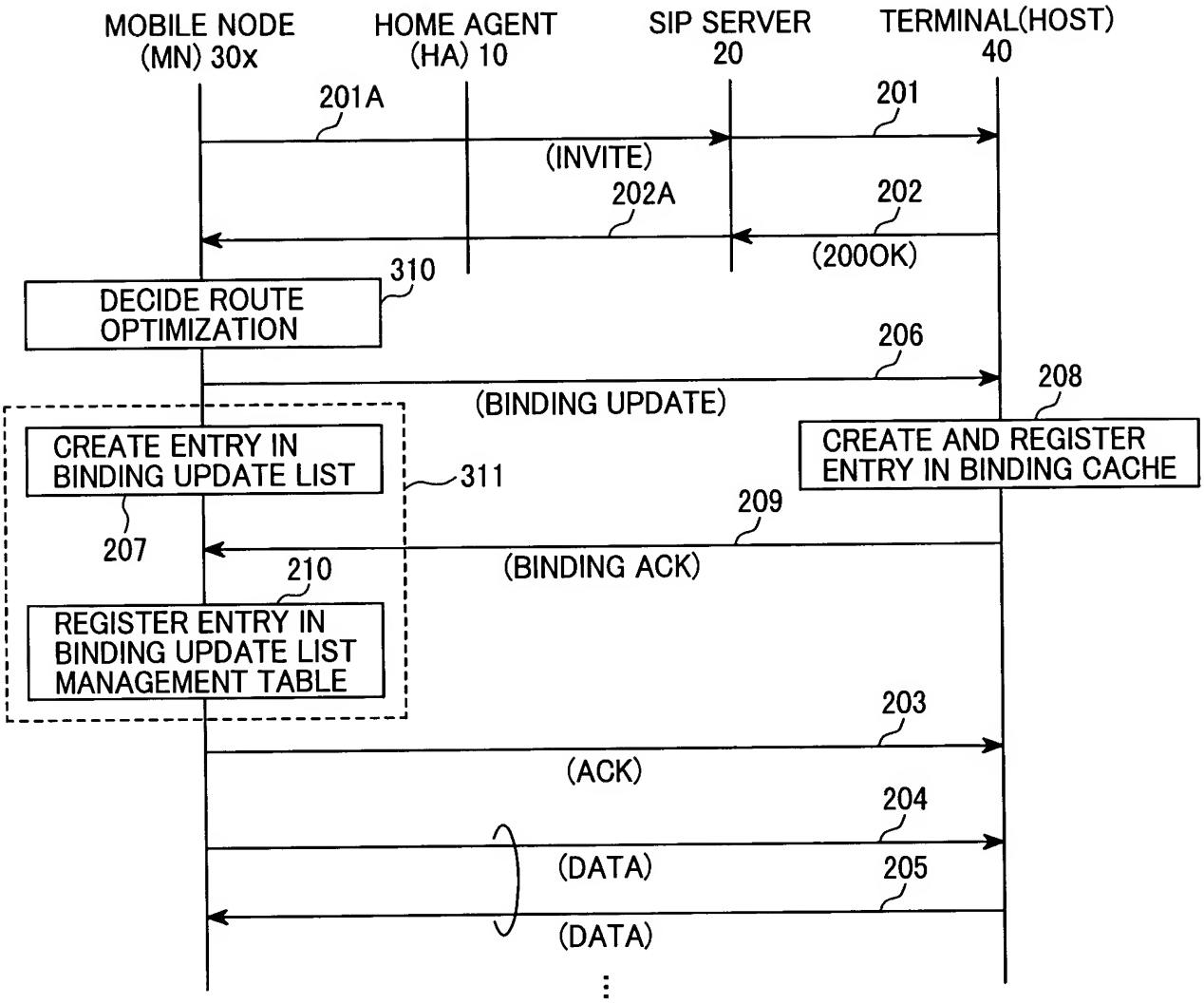

MOBILE NODE (MN) 30x
HOME AGENT (HA) 10
SIP SERVER 20
TERMINAL(HOST) 40
201A
201
(INVITE)
202A
202
(200OK)
310
DECIDE ROUTE OPTIMIZATION
206
(BINDING UPDATE)
208
CREATE AND REGISTER ENTRY IN BINDING CACHE
CREATE ENTRY IN BINDING UPDATE LIST
311
209
207
(BINDING ACK)
210
REGISTER ENTRY IN BINDING UPDATE LIST MANAGEMENT TABLE
203
(ACK)
204
(DATA)
205
(DATA)

FIG.21

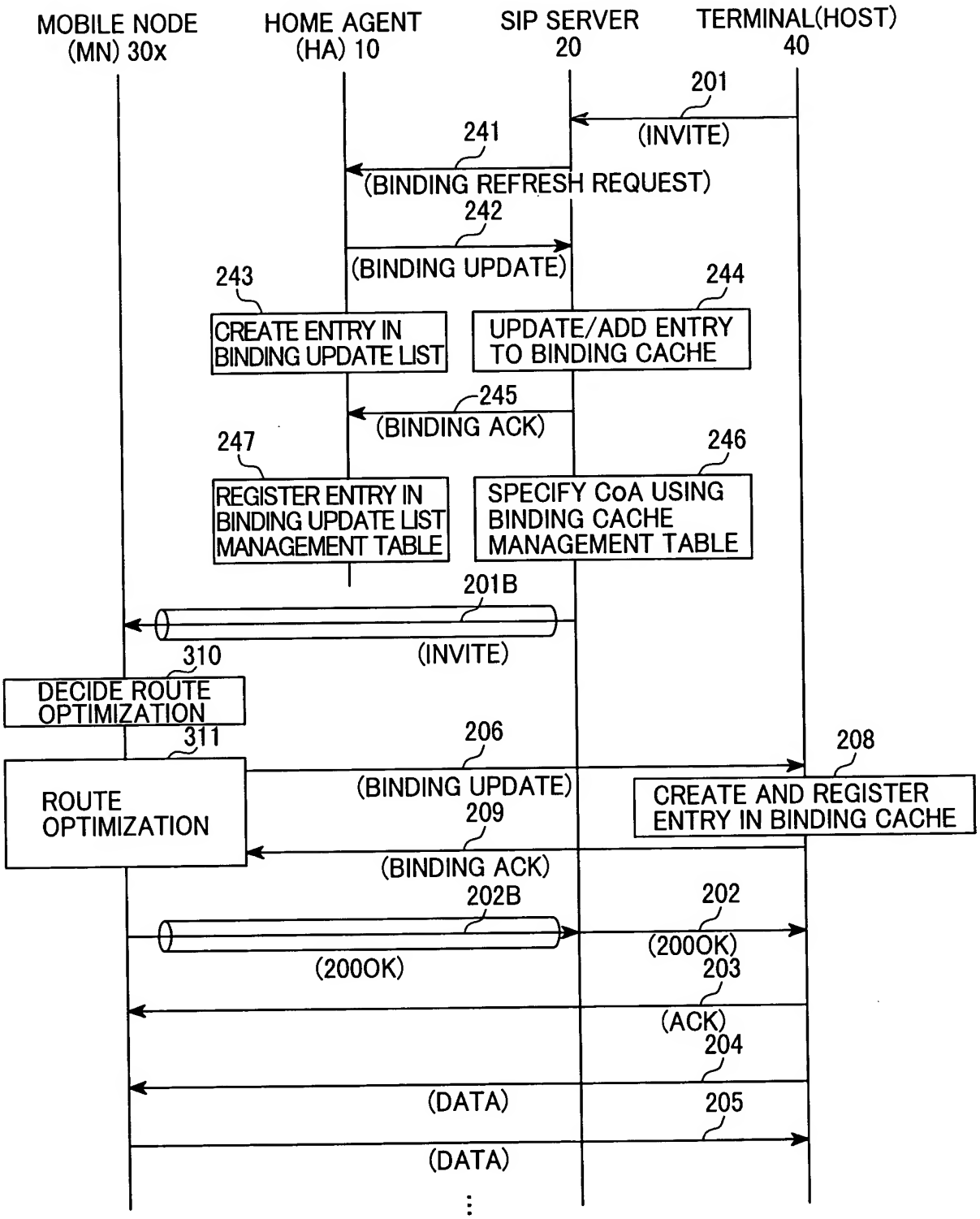

MOBILE NODE
(MN) 30x
HOME AGENT
(HA) 10
SIP SERVER
20
TERMINAL(HOST)
40
201
(INVITE)
241
(BINDING REFRESH REQUEST)
242
(BINDING UPDATE)
243
CREATE ENTRY IN BINDING UPDATE LIST
244
UPDATE/ADD ENTRY TO BINDING CACHE
245
(BINDING ACK)
247
REGISTER ENTRY IN BINDING UPDATE LIST MANAGEMENT TABLE
246
SPECIFY CoA USING BINDING CACHE MANAGEMENT TABLE
201B
(INVITE)
310
DECIDE ROUTE OPTIMIZATION
311
ROUTE OPTIMIZATION
206
(BINDING UPDATE)
208
CREATE AND REGISTER ENTRY IN BINDING CACHE
209
(BINDING ACK)
202B
(200OK)
202
(200OK)
203
(ACK)
204
(DATA)
205
(DATA)

FIG.22

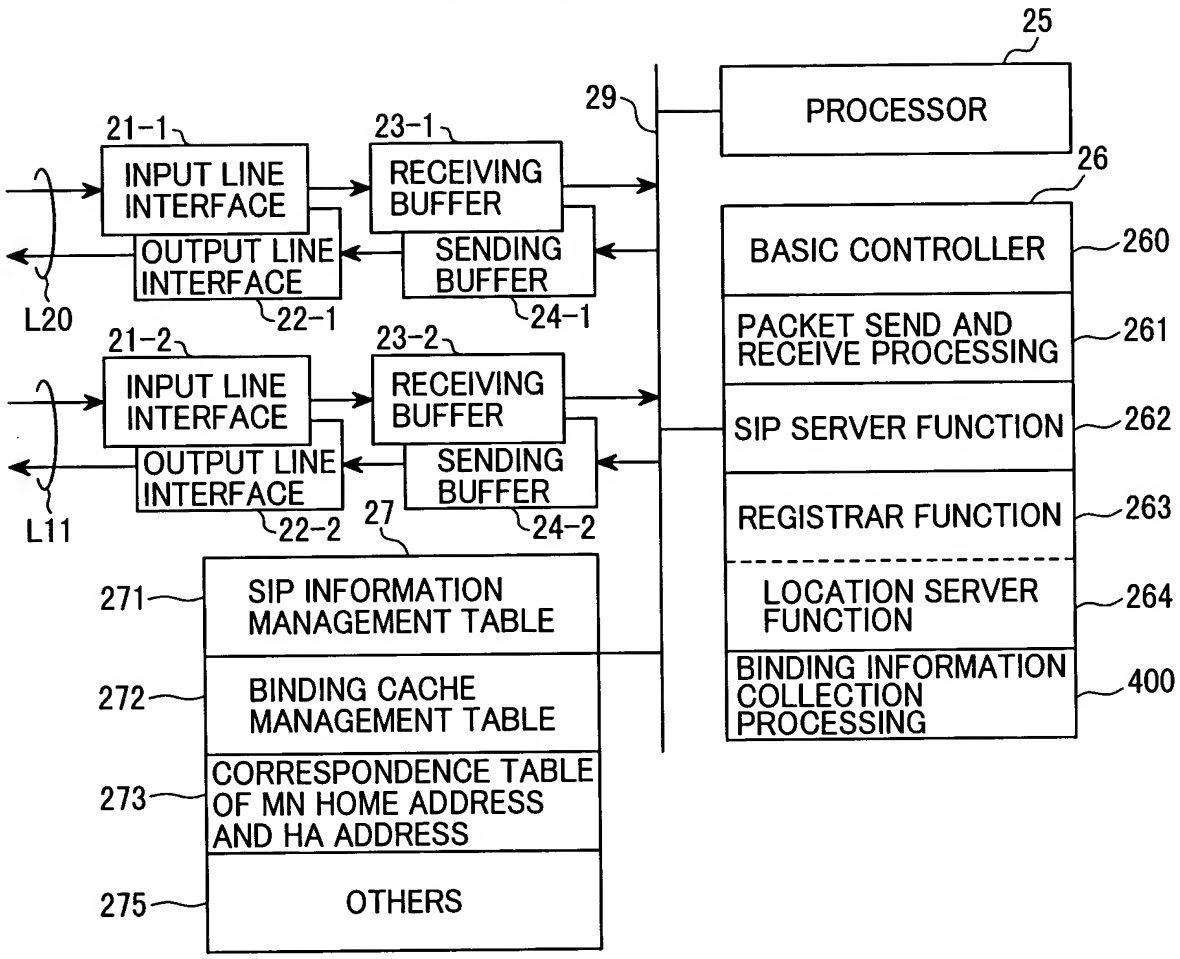

SIP SERVER 20
25
PROCESSOR
29
21-1
INPUT LINE INTERFACE
23-1
RECEIVING BUFFER
OUTPUT LINE INTERFACE
22-1
SENDING BUFFER
24-1
L20
21-2
INPUT LINE INTERFACE
23-2
RECEIVING BUFFER
OUTPUT LINE INTERFACE
22-2
SENDING BUFFER
24-2
L11
27
271
SIP INFORMATION MANAGEMENT TABLE
272
BINDING CACHE MANAGEMENT TABLE
273
CORRESPONDENCE TABLE OF MN HOME ADDRESS AND HA ADDRESS
275
OTHERS
26
BASIC CONTROLLER
260
PACKET SEND AND RECEIVE PROCESSING
261
SIP SERVER FUNCTION
262
REGISTRAR FUNCTION
263
LOCATION SERVER FUNCTION
264
BINDING INFORMATION COLLECTION PROCESSING
400

FIG.23

CORRESPONDENCE TABLE OF
MN HOME ADDRESS AND HA ADDRESS 273

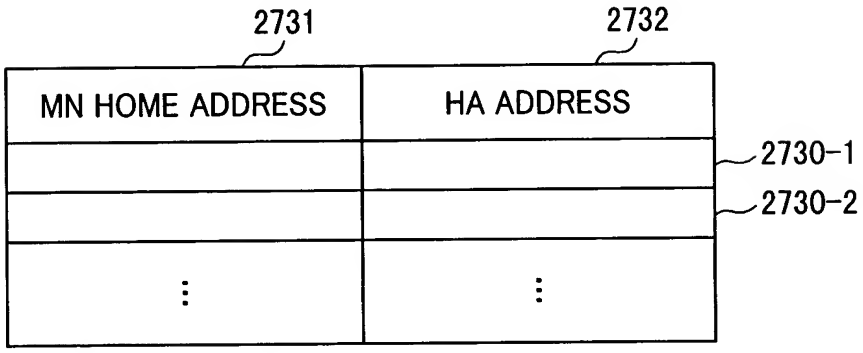


FIG.24

BINDING REFRESH REQUEST MESSAGE 70C

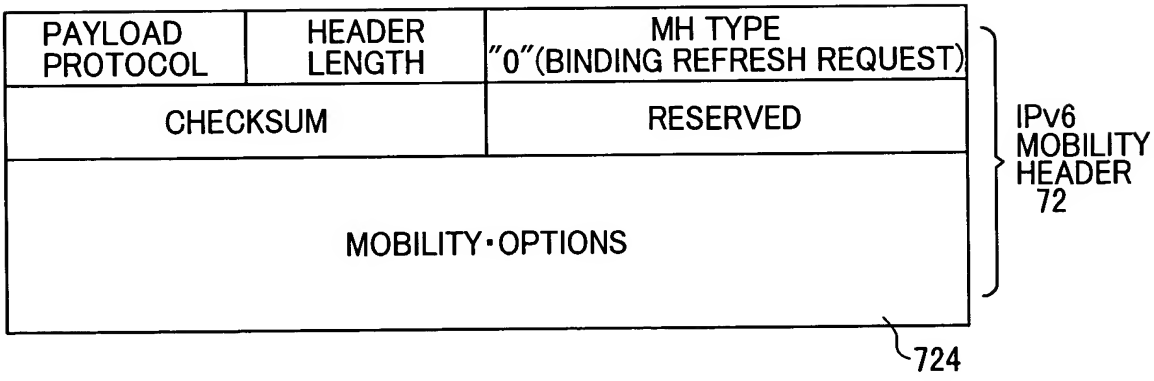


FIG.25

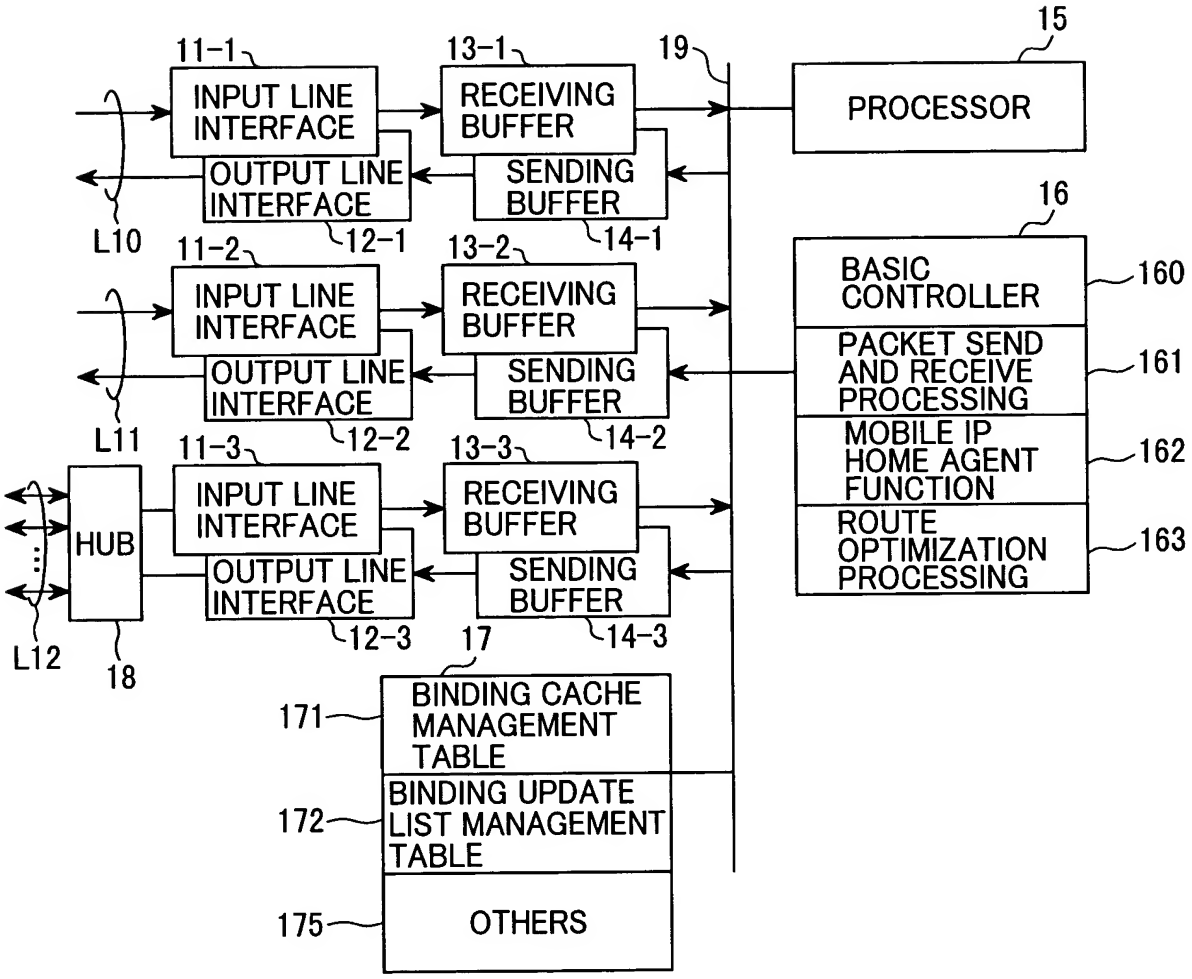

HOME AGENT 10
11-1
INPUT LINE INTERFACE
13-1
RECEIVING BUFFER
19
15
PROCESSOR
OUTPUT LINE INTERFACE
12-1
SENDING BUFFER
14-1
L10
11-2
INPUT LINE INTERFACE
13-2
RECEIVING BUFFER
16
BASIC CONTROLLER
160
PACKET SEND AND RECEIVE PROCESSING
161
OUTPUT LINE INTERFACE
12-2
SENDING BUFFER
14-2
L11
MOBILE IP HOME AGENT FUNCTION
162
11-3
INPUT LINE INTERFACE
13-3
RECEIVING BUFFER
HUB
ROUTE OPTIMIZATION PROCESSING
163
OUTPUT LINE INTERFACE
12-3
SENDING BUFFER
14-3
L12
18
17
171
BINDING CACHE MANAGEMENT TABLE
172
BINDING UPDATE LIST MANAGEMENT TABLE
175
OTHERS

FIG.26

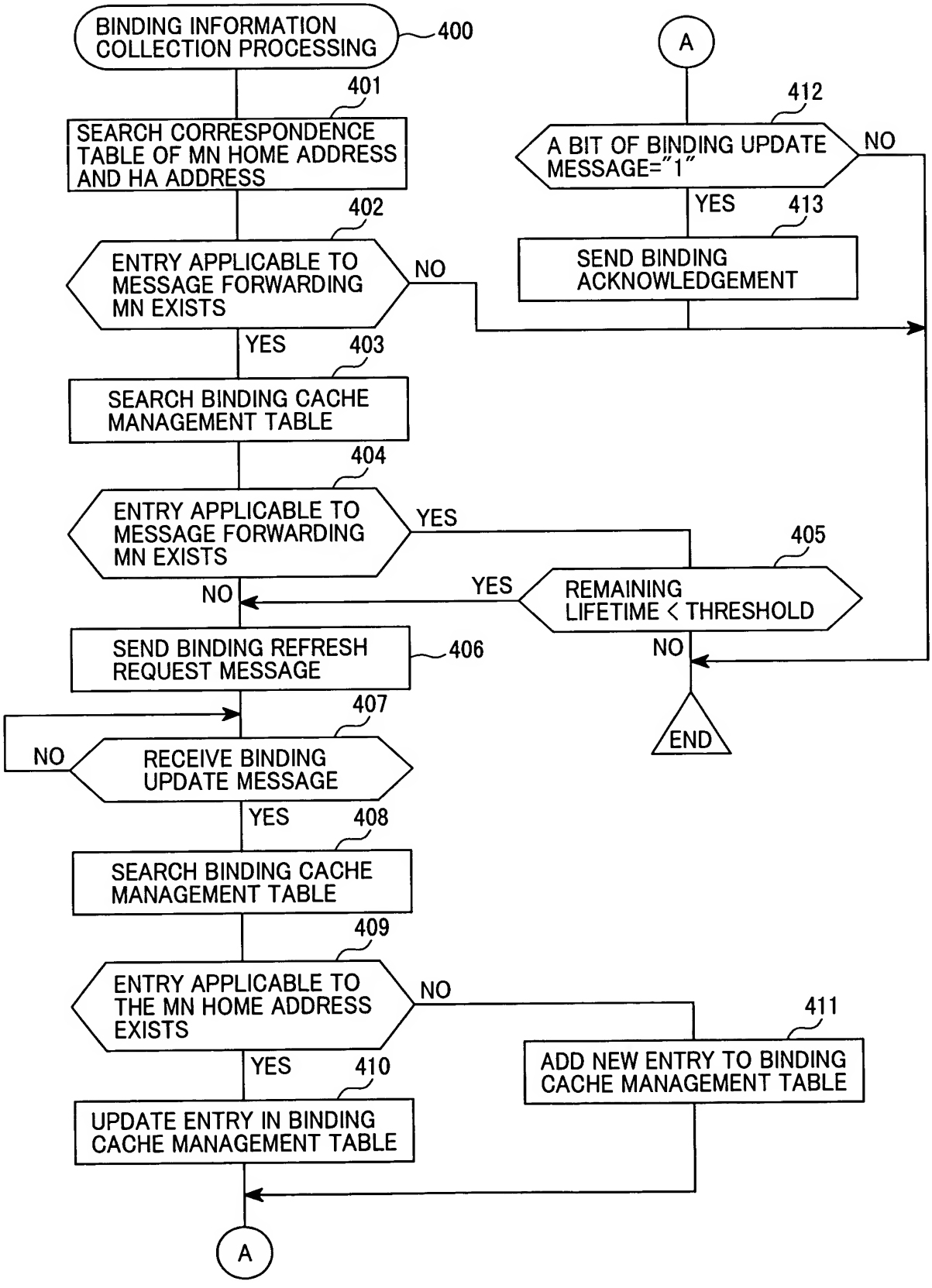

BINDING INFORMATION COLLECTION PROCESSING
400
401
SEARCH CORRESPONDENCE TABLE OF MN HOME ADDRESS AND HA ADDRESS
402
ENTRY APPLICABLE TO MESSAGE FORWARDING MN EXISTS
NO
YES
403
SEARCH BINDING CACHE MANAGEMENT TABLE
404
ENTRY APPLICABLE TO MESSAGE FORWARDING MN EXISTS
YES
NO
405
REMAINING LIFETIME < THRESHOLD
YES
NO
406
SEND BINDING REFRESH REQUEST MESSAGE
407
NO
RECEIVE BINDING UPDATE MESSAGE
YES
408
SEARCH BINDING CACHE MANAGEMENT TABLE
409
ENTRY APPLICABLE TO THE MN HOME ADDRESS EXISTS
NO
YES
410
UPDATE ENTRY IN BINDING CACHE MANAGEMENT TABLE
411
ADD NEW ENTRY TO BINDING CACHE MANAGEMENT TABLE
A
A
412
A BIT OF BINDING UPDATE MESSAGE="1"
NO
YES
413
SEND BINDING ACKNOWLEDGEMENT
END

FIG.27

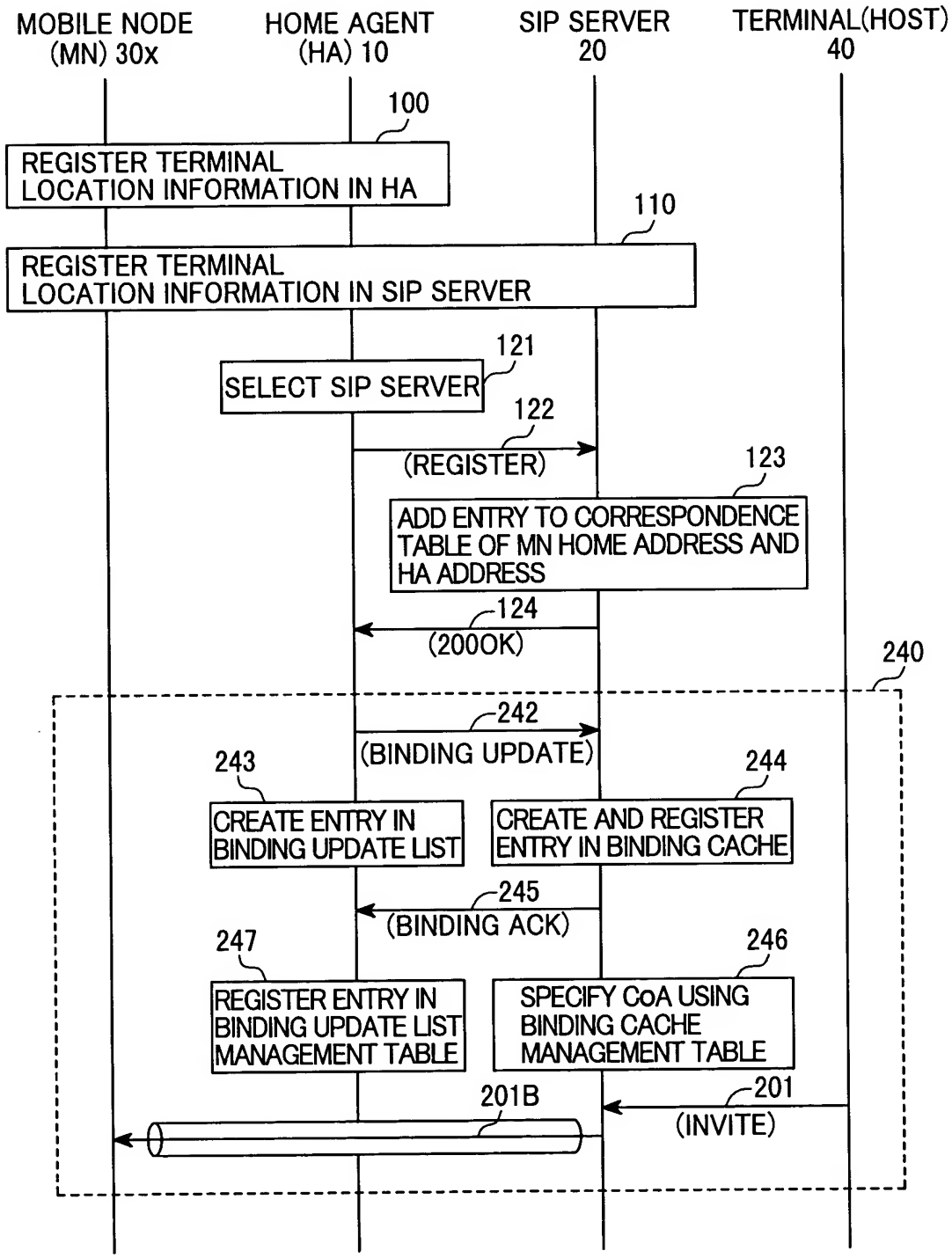

MOBILE NODE (MN) 30x
HOME AGENT (HA) 10
SIP SERVER 20
TERMINAL(HOST) 40
100
REGISTER TERMINAL LOCATION INFORMATION IN HA
110
REGISTER TERMINAL LOCATION INFORMATION IN SIP SERVER
121
SELECT SIP SERVER
122
(REGISTER)
123
ADD ENTRY TO CORRESPONDENCE TABLE OF MN HOME ADDRESS AND HA ADDRESS
124
(200OK)
240
242
(BINDING UPDATE)
243
CREATE ENTRY IN BINDING UPDATE LIST
244
CREATE AND REGISTER ENTRY IN BINDING CACHE
245
(BINDING ACK)
247
REGISTER ENTRY IN BINDING UPDATE LIST MANAGEMENT TABLE
246
SPECIFY CoA USING BINDING CACHE MANAGEMENT TABLE
201B
201
(INVITE)

FIG.28

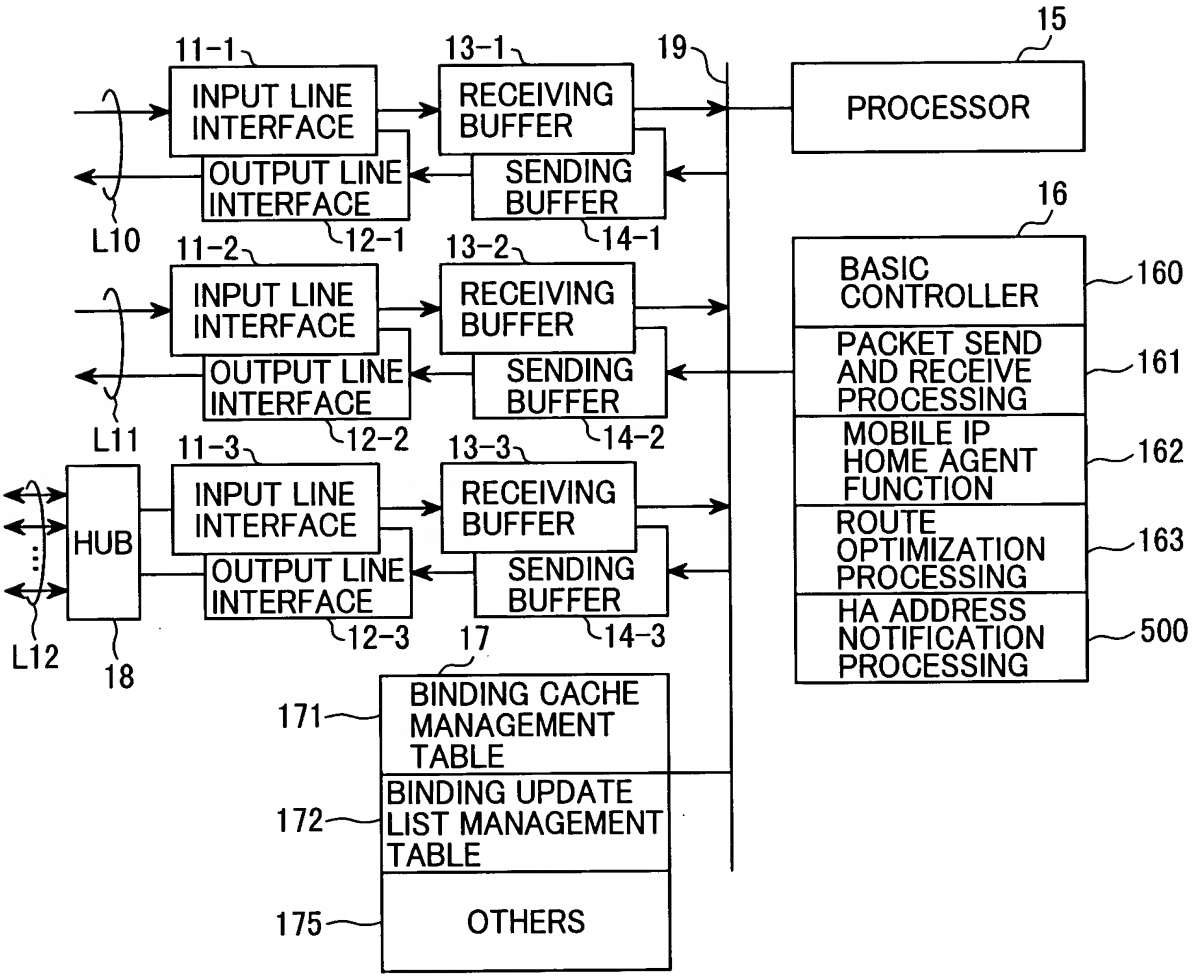

HOME AGENT 10
11-1
INPUT LINE INTERFACE
13-1
RECEIVING BUFFER
19
15
PROCESSOR
OUTPUT LINE INTERFACE
12-1
SENDING BUFFER
14-1
L10
16
11-2
INPUT LINE INTERFACE
13-2
RECEIVING BUFFER
BASIC CONTROLLER
160
OUTPUT LINE INTERFACE
12-2
SENDING BUFFER
14-2
PACKET SEND AND RECEIVE PROCESSING
161
L11
11-3
INPUT LINE INTERFACE
13-3
RECEIVING BUFFER
MOBILE IP HOME AGENT FUNCTION
162
HUB
OUTPUT LINE INTERFACE
12-3
SENDING BUFFER
14-3
ROUTE OPTIMIZATION PROCESSING
163
L12
18
17
HA ADDRESS NOTIFICATION PROCESSING
500
171
BINDING CACHE MANAGEMENT TABLE
172
BINDING UPDATE LIST MANAGEMENT TABLE
175
OTHERS

FIG.29

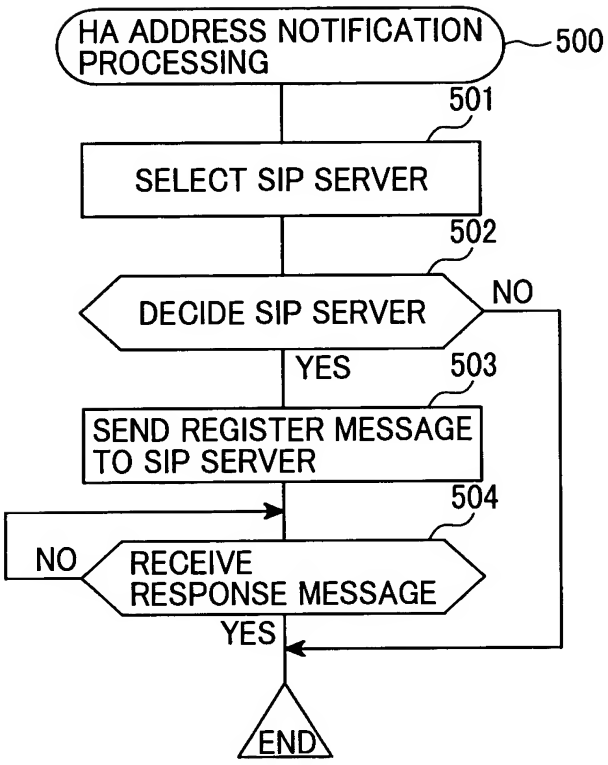
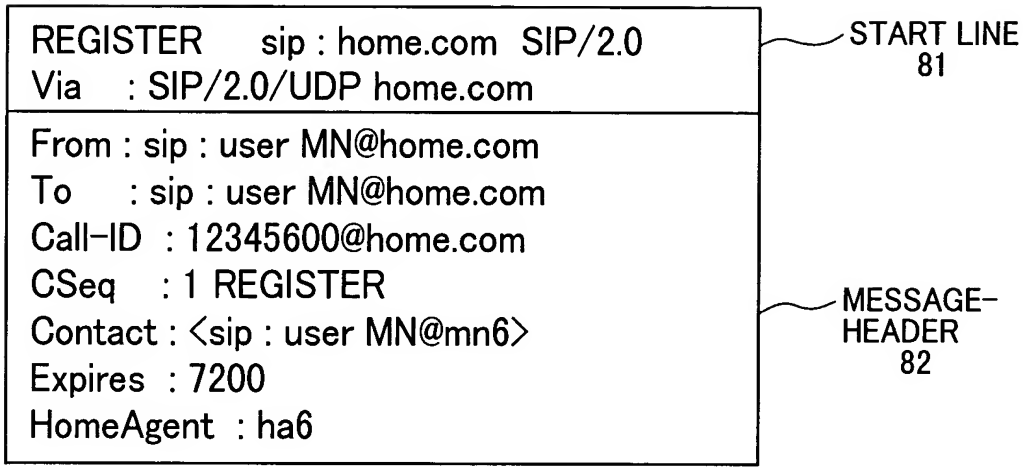

HA ADDRESS NOTIFICATION PROCESSING
500
501
SELECT SIP SERVER
502
DECIDE SIP SERVER
NO
YES
503
SEND REGISTER MESSAGE TO SIP SERVER
504
NO
RECEIVE RESPONSE MESSAGE
YES
END

FIG.30

SIP REGISTER MESSAGE 80C